

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant(s): Pillar et al.  
Title: REFUSE VEHICLE CONTROL  
SYSTEM AND METHOD  
Appl. No.: 10/668,002  
Filing Date: 09/22/2003  
Examiner: Broadhead, Brian J.  
Art Unit: 3661  
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<b>CERTIFICATE OF EXPRESS MAILING</b>	
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**DECLARATION UNDER 37 C.F.R. § 1.131**

Commissioner for Patents  
Washington, D.C. 20231

Sir:

We, Duane Pillar and William Woolman, state and declare that:

1. We are the inventors of claims 1-7, 13, 14, 31-35, 46-48 and 52-68 of the patent application identified above.
2. Prior to May 15, 2003, we conceived and reduced to practice in the United States the invention described and claimed in claims 1-7, 13, 14, 31-35, 46-48 and 52-68 of the above-referenced application as evidenced by the attached Exhibits A, B-1, B-2, C, D, E, F-1, F-2, G, H, I, J and K referenced herein.
3. We created each of Exhibits A, B-1, B-2, C, D, E, F-1, F-2, G, H, I, J and K prior to May 15, 2003.
4. Exhibit A is a general description of a loading refuse vehicle which states:  
  
The control system will incorporate proprietary extended CAN (J1939/1 & /2) data bus network communications to monitor and

control various system functions. A VIM (Vehicle Interface Module), various Input and Output modules, operator display and numerous body and cab mounted switches will be used for system operation. This equipment shall be exposed to various environmental extremes (i.e. High Moisture Exposure, Low/High Temperature, Shock, Vibration, etc.). It is further intended that the VIM and display will be designed as a Line Replaceable Unit (LRU) for easy field replacement/servicing.

5. Exhibits B-1 and B-2 are specification sheets for the loading refuse vehicle.

B-1 states: The chassis interface consists of a number of signals.

B-2 states: When the signal is "high" the controlling system (PLC) knows that the engine of the truck is running, this engine delivers by use of the PTO (Power Take Off) the necessary hydraulic energy.

6. Exhibit C is a specification sheet for the loading refuse vehicle. Exhibit C. states:

Releasing the brake pedal and/or the clutch pedal results in stopping any operation of the body.

7. Exhibit D is a specification sheet for the loading refuse vehicle. Exhibit D states:

Signal "Speed > 10km/h" comes from the tachnograph. This signal becomes "high" when the speed is larger than 10 km/h. When the drive signal becomes "high" the controlling system ensures that the body and lifting device cannot be started.

8. Exhibit E is a specification sheet for the loading refuse vehicle and shows when the vehicle is in reverse the output device is disabled.

9. Exhibits F-1 and F-2 are specification sheets for the loading refuse vehicle. They show a refuse loader, a refuse compactor and a tailgate.

10. Exhibit G is a specification sheet for the loading refuse vehicle. It states:

As soon as the vehicle starts driving, an already started compaction cycle will be completed. If the function start "continuous" is activated, it will stop after the compaction mechanism has finished its cycle.

11. Exhibit H is a specification sheet for the loading refuse vehicle. It shows an emergency circuit configured to operate under numerous conditions.

12. Exhibit I is a specification sheet for the loading refuse vehicle. It states:

In this configuration the signal "D" (drive) is a combined signal of the signal "parking brake" and the "neutral" signal of the automatic gear box. Signal "D" drive is "high" if: 1) the automatic gear box is in Drive; 2) the automatic gear box is in Neutral and the Parking brake is not activated. Signal "D" drive is "low" if: 1) the automatic gear box is in Neutral and the Parking brake is activated.

13. Exhibit J is a specification sheet for the loading refuse vehicle. It states:

By this function the automatic gearbox is put into the Neutral position when the brake pedal is applied by the driver. As soon as the driving speed of the vehicle is lower than 5 km/h the gearbox is shifted into Neutral. When the Neutral position is reached the body is allowed to go into operation.

14. Exhibit K is a specification sheet for the loading refuse vehicle. It states:

To realize this option, the chassis needs to be ordered with a modification so that when the signal "Auto-neutral" is "high" the automatic gearbox is shifted into Neutral after the brake pedal is operated and the driving speed is lower than 5 km/h. Additional to the "Auto-neutral" option it is needed that after releasing the brake pedal the automatic gearbox is shifted into Drive.

15. The following claim charts provide a more specific correlation between Exhibits A, B-1, B-2, C, D, E, F-1, F-2, G, H, I, J and K and claims 1-7, 13, 14, 31-35, 46-48 and 52-68 of the patent application identified above.

Claim 1	
Text of Claim	Evidence of Reduction to Practice
A refuse vehicle comprising:	Exhibit A
a transmission; and	Exhibit B-1
a control system which comprises:	Exhibit A
a plurality of microprocessor based interface modules;	Exhibit A
a communication network configured to interconnect the plurality of interface modules; and	Exhibit A
at least one output device;	Exhibit A
wherein the control system is configured to immediately disable the output device when the transmission is put into gear.	Exhibit C

Claim 2	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 1 wherein the control system is configured to, when the transmission is in gear, enable the output device when a brake is engaged and/or a clutch is disengaged.	Exhibit I

Claim 3	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 2 wherein the transmission is a manual transmission.	Exhibit C

Claim 4	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 1 further comprising a chassis which includes the transmission; and a body; wherein the output device pertains to the body of the refuse vehicle.	Exhibit A

Claim 5	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 1 wherein the output device receives power from a power takeoff.	Exhibit B-2

Claim 6	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 1 wherein the control system is configured to enable the output device by moving the transmission out of gear when a brake is engaged and the refuse vehicle is not moving faster than a threshold speed.	Exhibit J

Claim 7	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 6 wherein the control system is configured to move the transmission into gear when the brake is disengaged.	Exhibit K

Claim 13	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 1 wherein the control system further comprises a plurality of input devices; a plurality of output devices; and a transmission subsystem control system which includes an electronic control unit, the transmission subsystem control system being configured to include transmission status information;	Exhibit A shows various Input and Output modules, operator display and numerous body and cab mounted switches used for system operation. Transmission status was one of the data points being monitored.
wherein each of the plurality of interface modules is coupled to respective ones of the plurality of input devices and the plurality of output devices; wherein the transmission status information is communicated from the transmission subsystem control system to at least one of the plurality of interface modules where it is stored.	Exhibit A shows various Input and Output modules, operator display and numerous body and cab mounted switches used for system operation. Transmission status was one of the data points being monitored and stored.

Claim 14	
Text of Claim	Evidence of Reduction to Practice
A refuse vehicle comprising:	Exhibit A
a control system which comprises:	Exhibit B-1
a plurality of microprocessor based interface modules;	Exhibit A
a communication network configured to interconnect the plurality of interface modules; and	Exhibit A
at least one output device;	Exhibit A
wherein the control system is configured to disable the output device when the refuse vehicle reaches a threshold speed.	Exhibit D

Claim 31	
Text of Claim	Evidence of Reduction to Practice
A refuse vehicle comprising:	Exhibit A
a control system which comprises:	Exhibit B-1
a plurality of microprocessor based interface modules;	Exhibit A
a communication network configured to interconnect the plurality of interface modules; and	Exhibit A
at least one output device;	Exhibit A
wherein the control system is configured to disable the output device when the refuse vehicle is moving in reverse.	Exhibit E

Claim 32	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 31 wherein the output device receives power from a power takeoff.	Exhibit B-2

Claim 33	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 31 wherein the output device pertains to a group consisting of a refuse loader, a refuse compactor, a tailgate, and combinations thereof.	Exhibits F-1 and F-2

Claim 34	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 31 wherein the control system is configured to disable the output device from being actuated when the vehicle is moving in reverse, the control system being configured to enable, when the vehicle is moving in reverse, the output device to complete an operation initiated when the vehicle was not moving in reverse.	Exhibits E and G

Claim 35	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 31 further comprising a chassis; and a body; wherein the output device pertains to the body of the refuse vehicle.	Exhibits A and B-1

Claim 46	
Text of Claim	Evidence of Reduction to Practice
A refuse vehicle comprising:	Exhibit A
a control system comprising:	Exhibit A
a plurality of microprocessor based interface modules; and	Exhibit A
a communication network configured to interconnect the plurality of interface modules;	Exhibit A
wherein the control system is configured to prevent the refuse loader from initiating a refuse handling operation when the vehicle is moving, the control system being configured to allow, when the vehicle is moving, the refuse loader to complete a refuse handling operation initiated when the vehicle was not moving.	Exhibits D and G

Claim 47	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 46 wherein the refuse handling operation comprises compacting refuse in the refuse vehicle.	Exhibits F-1 and F-2

Claim 48	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 46 wherein the refuse handling operation comprises loading refuse in the refuse vehicle.	Exhibit F-2

Claim 52	
Text of Claim	Evidence of Reduction to Practice
A refuse vehicle comprising:	Exhibit A
a control system comprising:	Exhibit A
a plurality of input devices including an emergency stop;	Exhibit H
a plurality of output devices;	Exhibit A
a plurality of microprocessor based interface modules and a communication network, the plurality of interface modules being interconnected to each other by way of the communication network, each of the plurality of interface modules being coupled to respective ones of the plurality of input devices and the plurality of output devices, and the plurality of interface modules storing I/O status information for the plurality of input devices and the plurality of output devices; and	Exhibit A
wherein the control system is configured to disable the plurality of output devices when the emergency stop is activated.	Exhibit H

Claim 53	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 52 further comprising a chassis; and a body; wherein the plurality of output devices include output devices pertaining to the body that receive power from a power takeoff.	Exhibit A

Claim 54	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 52 further comprising a chassis; and a body; wherein the plurality of output devices are those output devices pertaining to the body.	Exhibit B-2



Claim 55	
Text of Claim	Evidence of Reduction to Practice
A method for controlling a refuse vehicle comprising:	Exhibit A
disabling a plurality of output devices of the refuse vehicle when a transmission of the refuse vehicle is in gear;	Exhibit D
enabling the plurality of output devices when a brake of the refuse vehicle is engaged;	Exhibit J
disabling the plurality of output devices when the brake pedal is disengaged;	Exhibits D and J
wherein all three steps are performed by a control system that comprises a plurality of microprocessor based interface modules, the plurality of interface modules being interconnected by way of a communication network.	Exhibit A

Claim 56	
Text of Claim	Evidence of Reduction to Practice
The method of claim 55 wherein the plurality of output devices are enabled by moving the transmission out of gear when the brake is engaged.	Exhibit J

Claim 57	
Text of Claim	Evidence of Reduction to Practice
The method of claim 56 wherein the plurality of output devices are disabled by moving the transmission back into gear when the brake is disengaged.	Exhibits D and J

Claim 58	
Text of Claim	Evidence of Reduction to Practice
The method of claim 55 wherein the plurality of output devices receive power from a power takeoff.	Exhibit B-2

Claim 59	
Text of Claim	Evidence of Reduction to Practice
A refuse vehicle comprising:	Exhibit A
a transmission; and	Exhibit B-1
a control system which comprises:	Exhibit A
a plurality of microprocessor based interface modules;	Exhibit A
a communication network configured to interconnect the plurality of interface modules; and	Exhibit A
at least one output device;	Exhibit A
wherein the control system is configured to disable the output device when the transmission is in gear; and	Exhibit D
wherein the control system is configured to enable the output device by moving the transmission out of gear when a brake is engaged and the refuse vehicle is not moving faster than a threshold speed of approximately 2 kilometers per hour to approximately 20 kilometers per hour.	Exhibits D and J

Claim 60	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 59 wherein the threshold speed is between approximately 4 kilometers per hour and approximately 8 kilometers per hour.	This is within the scope of Exhibit J.

Claim 61	
Text of Claim	Evidence of Reduction to Practice
A refuse vehicle comprising:	Exhibit A
a transmission; and	Exhibit B-1
a control system which comprises:	Exhibit A
a plurality of microprocessor based interface modules;	Exhibit A
a communication network configured to interconnect the plurality of interface modules; and	Exhibit A
at least one output device;	Exhibit A
wherein the control system is configured to disable the output device when the transmission is in gear; and	Exhibit D
wherein the control system is configured to disable the output device from being actuated	Exhibit G

Claim 61	
Text of Claim	Evidence of Reduction to Practice
when the transmission is in gear, the control system being configured to enable, when the transmission is in gear, the output device to complete an operation initiated when the transmission was not in gear.	

Claim 62	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 61 wherein the operation comprises compacting refuse in the refuse vehicle.	Exhibits F-1 and F-2

Claim 63	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 61 wherein the operation comprises loading refuse in the refuse vehicle.	Exhibit F-2

Claim 64	
Text of Claim	Evidence of Reduction to Practice
A refuse vehicle comprising:	Exhibit A
a control system which comprises:	Exhibit A
a plurality of microprocessor based interface modules;	Exhibit A
a communication network configured to interconnect the plurality of interface modules; and	Exhibit A
at least one output device;	Exhibit A
wherein the control system is configured to disable the output device when the refuse vehicle reaches a threshold speed of approximately 2 kilometers per hour to approximately 20 kilometers per hour.	This is within the scope of Exhibit J.

Claim 65	
Text of Claim	Evidence of Reduction to Practice
The refuse vehicle of claim 64 wherein the threshold speed is approximately 4 kilometers per hour to approximately 10 kilometers per hour.	This is within the scope of Exhibit J.

Claim 66	
Text of Claim	Evidence of Reduction to Practice
A refuse vehicle comprising:	Exhibit A
a control system which comprises:	Exhibit A
a plurality of microprocessor based interface modules;	Exhibit A
a communication network configured to interconnect the plurality of interface modules; and	Exhibit A
at least one output device which pertains to a refuse loader;	Exhibits A and F-2
wherein the control system is configured to disable the output device when the refuse vehicle reaches a threshold speed.	Exhibit J

Claim 67	
Text of Claim	Evidence of Reduction to Practice
A refuse vehicle comprising:	Exhibit A
a control system which comprises:	Exhibit A
a plurality of microprocessor based interface modules;	Exhibit A
a communication network configured to interconnect the plurality of interface modules; and	Exhibit A
at least one output device which pertains to a refuse compactor;	Exhibits A and F-2
wherein the control system is configured to disable the output device when the refuse vehicle reaches a threshold speed.	Exhibit J

Claim 68	
Text of Claim	Evidence of Reduction to Practice
A refuse vehicle comprising:	Exhibit A
a chassis;	
a body; and	
a control system which comprises:	Exhibit A
a plurality of microprocessor based interface modules;	Exhibit A
a communication network configured to interconnect the plurality of interface modules; and	Exhibit A
at least one output device which pertains to the body of the refuse vehicle;	Exhibit A and F-2
wherein the control system is configured to disable the output device when the refuse vehicle reaches a threshold speed.	Exhibit J

We hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

Date 9-28-2006

By:   
Duane Pillar

Date 9-28-2006

By:   
William Woolman

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**1. GENERAL DESCRIPTION:**

1.1.1. The intent of this design specification is to identify and provide the requirements for the control of the Geesink model GPM IIe rear loading refuse collection vehicle. The GPM IIe is suitable for the collection of bulky and/or domestic refuse and it can also handle various types of containers.

1.1.2. The control system will incorporate proprietary extended CAN (J1939/1 & /2) data bus network communications to monitor and control various system functions. A VIM (Vehicle Interface Module), Various Input and Output modules, operator display, and numerous body and cab mounted switches will be used for system operation. This equipment shall be exposed to various environmental extremes (i.e. High Moisture Exposure, Low/High Temperature, Shock, Vibration, etc.). It is further intended that the VIM, and display will be designed as a Line Replaceable Unit (LRU) for easy field replacement/servicing.

**1.2. CZII Component Hardware List:**

- 1.2.1. (1) Vehicle Interface Module part # 3321336
- 1.2.2. (2) 24V Input Modules # 3422795
- 1.2.3. (1) 24V Current Module# 3463572
- 1.2.4. (1) Cantrak 2400 display part # 3445002
- 1.2.5. Reference: Electrical Schematic # xxxxxxxx

**Oshkosh Truck Corporation**

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Part Number: 3463588

Description: *Spec, CZ2, GPM IIe*CAGE NO.  
XXX

Rev: NR

Engineering

4 of 26

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**Task:** Controlling the controls

**Item:** Functional description GCB-split

**Name:** Gert Meilink**Version:** 0.2**Date:****Page (s):** 5 van 38

## **2. General system**

### **2.1. Chassis interface**

#### **2.1.1. Scope**

The chassis interface consists of a number of signals.

The chassis provides signals to the PLC. But there are also signals from the PLC to the chassis.

In the used components signals are mentioned, which are used by the PLC. These are universal for each type of body which Geesink produces.

By use of a 21-pin connector the signals of the Geesink body is connected to the signals of the chassis.

The chassis builder or supplier/dealer collects needed the signals from the chassis.

Some chassis builders make use of module to convert their CAN system into conventional wiring and put a program in this module to generate the necessary signals.

Also a lot of suppliers use relays to generate the necessary signals.

#### **2.1.2. Used components / signals**

##### **2.1.2.1. D+ signal (from chassis)**

###### **2.1.2.1.1. Body:**

This signal initiates that the engine of the truck is running.

When this signal is "high" the controlling system (PLC) knows that the engine of the truck is running, this engine delivers by use of the PTO (Power Take Off) the necessary hydraulic energy.

###### **2.1.2.1.2. Chassis:**

This signal comes from the check light of the battery.

##### **2.1.2.2. Speed > 5km/h (from chassis)**

###### **2.1.2.2.1. Body:**

This signal is used for the GCP (two-compartment) body and takes care that the bin lifting frames are raised when driving faster than 5 km/h.

When the vehicle drives faster than 5 km/h this signal becomes "high".

Not used for the GCB-split.

###### **2.1.2.2.2. Chassis:**

Signal "Speed > 5 km/h" comes from the tachograph. This signal becomes "high" when the speed is larger than 5 km/h.

## GEESINK NORBA GROUP

A N O S H K O S H C O M P A N Y

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**Page (s):** 5 van 38

**2. General system****2.1. Chassis interface****2.1.1. Scope**

The chassis interface consists of a number of signals.

The chassis provides signals to the PLC. But there are also signals from the PLC to the chassis.

In the used components signals are mentioned, which are used by the PLC. These are universal for each type of body which Geesink produces.

By use of a 21-pin connector the signals of the Geesink body is connected to the signals of the chassis.

The chassis builder or supplier/dealer collects needed the signals from the chassis.

Some chassis builders make use of module to convert their CAN system into conventional wiring and put a program in this module to generate the necessary signals.

Also a lot of suppliers use relays to generate the necessary signals.

**2.1.2. Used components / signals****2.1.2.1. D+ signal (from chassis)****2.1.2.1.1. Body:**

This signal initiates that the engine of the truck is running.

When this signal is "high" the controlling system (PLC) knows that the engine of the truck is running, this engine delivers by use of the PTO (Power Take Off) the necessary hydraulic energy.

**2.1.2.1.2. Chassis:**

This signal comes from the check light of the battery.

**2.1.2.2. Speed > 5km/h (from chassis)****2.1.2.2.1. Body:**

This signal is used for the GCP (two-compartment) body and takes care that the bin lifting frames are raised when driving faster than 5 km/h.

When the vehicle drives faster than 5 km/h this signal becomes "high".

Not used for the GCB-split.

**2.1.2.2.2. Chassis:**

Signal "Speed > 5 km/h" comes from the tachograph. This signal becomes "high" when the speed is larger than 5 km/h.



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When this signal is "high" the vehicle has to restrictions to make:

- Prevent driving faster than 30 km/h
- Shut down the engine when the vehicle is put into Reverse.

### **2.1.3. Operating principle body in combination with vehicle provisions**

#### **2.1.3.1. Normal operating principle**

##### **2.1.3.1.1. Scope**

When the gearbox of the vehicle is not in its Neutral position all the functions on the body are blocked for operation. This is to prevent that the vehicle wants to drive away when a raised revs control is requested from the body.

##### **2.1.3.1.2. Realisation in the chassis:**

This function is realised by the vehicle by giving a "low" signal on the PTO / Neutral signal.  
 The Drive signal is not used for these signals.

#### **2.1.3.2. Operating principle of "Auto-neutral" function in case of a manual operated gearbox**

##### **2.1.3.2.1. Scope**

The function "Auto-neutral" in combination with a manual operated gearbox can be used during the collection of refuse.

The driver of the vehicle needs only to apply the brake pedal and/or the clutch pedal without putting the gearbox into Neutral position, to allow the body any operation. During the collection of refuse the driver needs to keep the brake pedal and/or the clutch pedal activated.

Releasing the brake pedal and/or the clutch pedal results in stopping any operation of the body.

It is possible to add the function "Compacting during driving" to this option. For more information look in this paragraph.

##### **2.1.3.2.2. Realisation in the chassis:**

The Neutral signal of the combined signal PTO / Neutral is bridged.  
 The Drive signal is used by this function.  
 For more information look in this paragraph.

#### **2.1.3.3. Operating principle of "Auto-neutral" function in case of a automatic gearbox**

##### **2.1.3.3.1. Scope**

By this function the automatic gearbox is put into the Neutral position when the brake pedal is applied by the driver. As soon as the driving speed of the vehicle is lower then 5 km/h the gearbox is shifted into Neutral. When the Neutral position is reached the body is allowed to go into operation.

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**Page (s):** 6 van 38

### 2.1.2.3. Speed > 10 km/h (from chassis)

#### 2.1.2.3.1. Body:

This signal is used for the GCP (two-compartment) body and takes care that the scatter guard is closed when driving faster than 10 km/h, so damaging of the scatter guard is prevented.

When the vehicle drives faster than 10 km/h this signal becomes "high".

Not used for the GCB-split.

#### 2.1.2.3.2. Chassis:

Signal "Speed > 10 km/h" comes from the tachograph.

This signal becomes "high" when the speed is larger than 10 km/h.

### 2.1.2.4. Parking brake signal (from chassis)

#### 2.1.2.4.1. Body:

This signal is used for a body together with a crane loading device. This signal releases the revolution control. By use of this signal it is prevented that vehicle drives away, when the vehicle is not put on the parking brake.

#### 2.1.2.4.2. Chassis:

This signal is provided by the parking brake.

The signal becomes "high" when the vehicle is put on the parking brake.

### 2.1.2.5. Drive signal (from chassis)

#### 2.1.2.5.1. Body:

When the drive signal becomes "high" the controlling system ensures that the body and lifting device can not be started.

In case of a automatic gearbox, this signal prevents that the vehicle want to drive away when the "D" (drive) of the automatic gearbox is selected.

In case of a manual operated gearbox, this signal prevents that the driver wants/needs to drive away at a to high revolution number.

The chassis uses the signal for switching the revolution control from 1050 rpm to 800 rpm. For more information see the function compaction during driving.

#### 2.1.2.5.2. Chassis in case of a automatic gearbox:

In this configuration the signal "D" (drive) is an combined signal of the signal "parking brake" and the "neutral" signal of the automatic gear box.

Signal "D" drive is "high" if:

- The automatic gear box is in Drive.
- The automatic gear box is in Neutral and the Parking brake is not activated.

Signal "D" drive is "low" if:

- The automatic gear box is in Neutral and the Parking brake is activated.

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- The automatic gear box is in Neutral and the braking pedal is activated.

#### 2.1.2.5.3. Chassis in case of a manual operated gearbox:

In this configuration the signal "D" (drive) is a combined signal of the signals "parking brake" and the "clutch" signal of the gear box.

Signal "D" drive is "high" if:

- The gear box is not in Neutral position and the clutch pedal or braking pedal is not operated.
- The gear box is in Neutral and the Parking brake is not activated.

Signal "D" drive is "low" if:

- The clutch pedal is operated.
- The brake pedal is operated.
- The gear box is in Neutral and the Parking brake is activated.

#### 2.1.2.6. Activating Auto-Neutral (from body)

##### 2.1.2.6.1. Body:

With the signal "Auto-Neutral" from the body the vehicle options, which are integrated by a chassis manufacturer, can be activated and de-activated.

This signal becomes "high" as soon as the body is switched on. This is activated by operating the switch "S1" in the cabin. If there are problems with the chassis, the influence of the body to the chassis can be stopped by switching of the switch "S1".

##### 2.1.2.6.2. Chassis:

When this signal becomes "high" the Auto-Neutral function is activated, so that the chassis can communicate with the body.

When this signal becomes "low" the Auto-Neutral function is de-activated, so that the chassis does not react on any signal of the body.

#### 2.1.2.7. Reverse signal (from chassis)

##### 2.1.2.7.1. Body:

When this signal is "high" the monitor in the cabin is switched on.

When this signal is "high", also the lifting is stopped.

##### 2.1.2.7.2. Chassis:

The reverse signal is taken from the (automatic) gearbox, when the reverse is selected.

#### 2.1.2.8. PTO / Neutral (from chassis)

##### 2.1.2.8.1. Body:

When this signal is "high" the functions on the body can be activated.

##### 2.1.2.8.2. Chassis:

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To realise this option, the chassis needs to be ordered with a modification so that when the signal "Auto-neutral" is "high" the automatic gearbox is shifted into Neutral after the brake pedal is operated and the driving speed is lower than 5 km/h.

Additional to the "Auto-neutral" option it is needed that after releasing the brake pedal the automatic gearbox is shifted into Drive.

### 2.1.3.5. Operating principle of "Compacting during driving"

#### 2.1.3.5.1. Scope

This option is only possible in combination with the functions "Auto-neutral" and "Stop & Go".

As soon as the vehicle starts driving, an already started compaction cycle will be completed. If the function start "continuous" is activated, it will stop after the compaction mechanism has finished its cycle.

*Normal operation:*

Step	Condition	Action
1	The vehicle is put into a gear (no more Neutral).	Active compaction cycle is finished.
2	Finished cycle.	Further operation of the body is not allowed.

#### 2.1.3.5.2. Realisation in the chassis:

The signal "D" (drive) will be added to the logic's in the signal "revolution control" in the chassis. The "D" (drive) signal arranges the switching in the programming of the revolution control.

For more information about the revolution control look in that paragraph.

### 2.1.3.6. Operating principle of "Loading while driving"

#### 2.1.3.6.1. Scope

With this option it is possible to load faster with the lifting device, because the lifting can also be operated during driving.

As long as the vehicle stands still, it is possible to start a lifting cycle. This cycle will continue as soon as the vehicle starts driving away.

*Normal operation:*

Step	Condition	Action
1	The vehicle is put into a gear (no more Neutral).	Active lifting cycle is finished.
2	The vehicle is put into Reverse.	The lifting cycle is stopped.

#### 2.1.3.6.2. Realisation in the chassis:

Signal "Reverse" is used for this option.

## 2.2. Condition for activating the body

### 2.2.1. Used components

<<<<Tabel met punten, wanneer belading, opbouw en persmechanisme wordt vrijgegeven.>>>>

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**Task:** Controlling the controls**Item:** Functional description GCB-split**Name:** Gert Meilink**Version:** 0.2**Date:****Page (s):** 14 van 38**2.5. Emergency circuit****2.5.1. Used components**

Type	Code	Description	Position	
Push button	S4	Emergency stop	cp-ET1	Standard
Push button	S5	Emergency stop	cp-ET2	Standard
Push button	S6	Emergency stop	cp-GCB1	GCB:
Push button	S7	Emergency stop	cp-GCB2	GCB:
Push button	S57	Emergency stop	cp-EGCB1	GCB:
Push button	S58	Emergency stop	cp-EGCB2	GCB:
Buzzer	B1	Buzzer	cp-MCB	Standard
Relay	K2	Emergency stop 1	CB	Standard
Relay	K3	Emergency stop 2	CB	Standard

**2.5.2. Operating principle**

After the emergency stop switches the circuit is made redundant.

By use of K2 and K3 the power supply is put on the hydraulic valves.

The emergency stop switches control directly K2 and K3 is controlled by the PLC.

The pneumatic valves are not controlled by K2 and K3 because this could result in unintentional movement of pneumatic operated parts.

The emergency stop circuit does not block the function of the "Release" button.

After activating an emergency switch an acoustic signal is given by the "Buzzer" in the cabin.

**2.6. Access door in body (Option: GPM: 09-D)****2.6.1. Used components**

Type	Code	Description	Position	
Limit switch	Q58	Door is closed in body		GPM: 09-D

**2.6.2. Operating principle**

When the access door is opened the functions of the body are switched off by Q58.

**2.7. Camera****2.7.1. Used components**

Type	Code	Description	Position	

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### 2.1.2.3. Speed > 10 km/h (from chassis)

#### 2.1.2.3.1. Body:

This signal is used for the GCP (two-compartment) body and takes care that the scatter guard is closed when driving faster than 10 km/h, so damaging of the scatter guard is prevented.  
 When the vehicle drives faster than 10 km/h this signal becomes "high".

Not used for the GCB-split.

#### 2.1.2.3.2. Chassis:

Signal "Speed > 10 km/h" comes from the tachograph.  
 This signal becomes "high" when the speed is larger than 10 km/h.

### 2.1.2.4. Parking brake signal (from chassis)

#### 2.1.2.4.1. Body:

This signal is used for a body together with a crane loading device. This signal releases the revolution control. By use of this signal it is prevented that vehicle drives away, when the vehicle is not put on the parking brake.

#### 2.1.2.4.2. Chassis:

This signal is provided by the parking brake.  
 The signal becomes "high" when the vehicle is put on the parking brake.

### 2.1.2.5. Drive signal (from chassis)

#### 2.1.2.5.1. Body:

When the drive signal becomes "high" the controlling system ensures that the body and lifting device can not be started.

In case of a automatic gearbox, this signal prevents that the vehicle want to drive away when the "D" (drive) of the automatic gearbox is selected.

In case of a manual operated gearbox, this signal prevents that the driver wants/needs to drive away at a to high revolution number.

The chassis uses the signal for switching the revolution control from 1050 rpm to 800 rpm. For more information see the function compaction during driving.

#### 2.1.2.5.2. Chassis in case of a automatic gearbox:

In this configuration the signal "D" (drive) is an combined signal of the signal "parking brake" and the "neutral" signal of the automatic gear box.

Signal "D" drive is "high" if:

- The automatic gear box is in Drive.
- The automatic gear box is in Neutral and the Parking brake is not activated.

Signal "D" drive is "low" if:

- The automatic gear box is in Neutral and the Parking brake is activated.



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When this signal is "high" the vehicle has to restrictions to make:

- Prevent driving faster than 30 km/h
- Shut down the engine when the vehicle is put into Reverse.

### **2.1.3. Operating principle body in combination with vehicle provisions**

#### **2.1.3.1. Normal operating principle**

##### **2.1.3.1.1. Scope**

When the gearbox of the vehicle is not in its Neutral position all the functions on the body are blocked for operation. This is to prevent that the vehicle wants to drive away when a raised revs control is requested from the body.

##### **2.1.3.1.2. Realisation in the chassis:**

This function is realised by the vehicle by giving a "low" signal on the PTO / Neutral signal.  
 The Drive signal is not used for these signals.

#### **2.1.3.2. Operating principle of "Auto-neutral" function in case of a manual operated gearbox**

##### **2.1.3.2.1. Scope**

The function "Auto-neutral" in combination with a manual operated gearbox can be used during the collection of refuse.

The driver of the vehicle needs only to apply the brake pedal and/or the clutch pedal without putting the gearbox into Neutral position, to allow the body any operation. During the collection of refuse the driver needs to keep the brake pedal and/or the clutch pedal activated.

Releasing the brake pedal and/or the clutch pedal results in stopping any operation of the body.

It is possible to add the function "Compacting during driving" to this option. For more information look in this paragraph.

##### **2.1.3.2.2. Realisation in the chassis:**

The Neutral signal of the combined signal PTO / Neutral is bridged.  
 The Drive signal is used by this function.  
 For more information look in this paragraph.

#### **2.1.3.3. Operating principle of "Auto-neutral" function in case of a automatic gearbox**

##### **2.1.3.3.1. Scope**

By this function the automatic gearbox is put into the Neutral position when the brake pedal is applied by the driver. As soon as the driving speed of the vehicle is lower then 5 km/h the gearbox is shifted into Neutral. When the Neutral position is reached the body is allowed to go into operation.

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To realise this option, the chassis needs to be ordered with a modification so that when the signal "Auto-neutral" is "high" the automatic gearbox is shifted into Neutral after the brake pedal is operated and the driving speed is lower than 5 km/h.

Additional to the "Auto-neutral" option it is needed that after releasing the brake pedal the automatic gearbox is shifted into Drive.

**2.1.3.5. Operating principle of "Compacting during driving"****2.1.3.5.1. Scope**

This option is only possible in combination with the functions "Auto-neutral" and "Stop & Go".

As soon as the vehicle starts driving, an already started compaction cycle will be completed. If the function start "continuous" is activated, it will stop after the compaction mechanism has finished its cycle.

*Normal operation:*

Step	Condition	Action
1	The vehicle is put into a gear (no more Neutral).	Active compaction cycle is finished.
2	Finished cycle.	Further operation of the body is not allowed.

**2.1.3.5.2. Realisation in the chassis:**

The signal "D" (drive) will be added to the logic's in the signal "revolution control" in the chassis. The "D" (drive) signal arranges the switching in the programming of the revolution control.

For more information about the revolution control look in that paragraph.

**2.1.3.6. Operating principle of "Loading while driving"****2.1.3.6.1. Scope**

With this option it is possible to load faster with the lifting device, because the lifting can also be operated during driving.

As long as the vehicle stands still, it is possible to start a lifting cycle. This cycle will continue as soon as the vehicle starts driving away.

*Normal operation:*

Step	Condition	Action
1	The vehicle is put into a gear (no more Neutral).	Active lifting cycle is finished.
2	The vehicle is put into Reverse.	The lifting cycle is stopped.

**2.1.3.6.2. Realisation in the chassis:**

Signal "Reverse" is used for this option.

**2.2. Condition for activating the body****2.2.1. Used components**

<<<<Tabel met punten, wanneer belading, opbouw en persmechanisme wordt vrijgegeven.>>>>